A BETTER CPI [*]

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The monthly consumer price index (CPI) is the most oft-cited measure of inflation and one of the most important and closely watched statistics in the U.S. economy. It is an indicator of how well the Federal Reserve is doing in achieving and maintaining low inflation, and it also is used to determine cost-of-living adjustments for many government programs, collective bargaining contracts, and individual income tax brackets.

Since 1995, the Bureau of Labor Statistics (BLS) has been eliminating biases that cause the index to overstate inflation, and further changes will come in January 1999. These changes are expected to create a more reliable index and by 1999 will have lowered measured CPI inflation by more than half a percentage point. Although this may seem like a small change, the effect of these changes is permanent so that measured inflation will be lower by this amount in all future years.

It is important that the CPI should measure inflation accurately or that the degree of bias be known. Macroeconomic policymakers such as the Fed then can take appropriate steps to keep inflation low, and the public can be informed about their successes and failures in achieving their goal. Also, if the CPI does not measure inflation correctly, cost-of-living adjustments based on it will have different effects from those desired when the commitments to make these adjustments were made. For example, adjusting Social Security benefits based on an upwardly biased CPI may shift spending power from the young toward the old.

This article will explain the types of biases that cause the CPI to overstate inflation, BLS actions to remove these biases, and the possible implications for monetary policy.

Sources of Bias in the CPI

The BLS has been studying possible biases in the CPI for a long time. The issue gained national prominence in 1996 when the Congress commissioned a panel of experts on price measurement issues, chaired by Michael Boskin of Stanford University, to examine biases in the CPI. Their report, "Toward a More Accurate Measure of the Cost of Living," identified four major sources of bias and estimated that they caused the CPI to overstate inflation by 1.1 percentage points per year at that time.

Substitution bias. Substitution bias occurs because the CPI measures the price changes of a fixed basket of goods and services and thus does not capture the savings that households enjoy when they change their spending in response to relative price changes of goods and services. For example, a rise in the price of beef leads people to buy more chicken in order to keep their food costs down. The Boskin report identifies two types of substitution bias. The first, estimated to raise measured inflation by 0.25 percentage point annually, is lower-level substitution bias and occurs when consumers substitute between similar items within a category (e.g., substituting between pippin and gala apples). The second type, estimated to boost inflation by 0.15 percentage point annually, is called upper-level substitution bias and occurs when consumers substitute between items from different categories (computers for television sets, for example) in response to price changes.

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Currently, the market basket that is priced is updated approximately once a decade. The new basket, based on consumers' purchases in 1993-1995, was introduced into the index earlier last year. As we move further away from this date, upper-level substitution bias may increase as spending patterns move away from the basket on which the present CPI is based.

Outlet bias. This type of bias is similar to substitution bias, but refers to where households shop rather than to what they purchase. Over the past 15 years, for example, the growth of discount stores has helped consumers lower their expenditures by offering high-volume purchases at reduced prices. The expansion of these establishments has not been adequately represented in the CPI, thus creating an upward bias of prices estimated at 0.1 percentage point per year. A similar problem may arise in the future as shopping online becomes more widespread.

New product bias. This bias occurs because new products, such as VCRs and cellular phones, are not introduced into the index until they are commonplace items. This means that the substantial price decreases and quality increases that occur during the early years following introduction are not captured by the index. A problem of dealing with this bias is that the BLS can never know in advance which of the many new products introduced each year will be successful and hence worthy of inclusion in the CPI.

Quality bias. This bias arises because some of any increase in the price of an item may be due to an improvement in quality, rather than being a pure price increase. For example, when car prices rise, this may be due to the addition of seat belts, air bags, or anti-smog devices, or to pure price inflation. In the case of cars, the BLS often uses the price of the new item as an optional feature before it becomes standard equipment as an indicator of what the improvement is worth to consumers. Quality improvements in other areas—such as medical care—are more difficult to measure so that bias is more likely to occur. And features of a product that become mandatory—such as seat belts, which buyers are forced to purchase even if they would prefer not to—are particularly difficult to handle.

The combination of quality bias and new product bias was estimated by the Boskin Commission to boost measured inflation by 0.6 percentage points annually. Any estimate of this magnitude, though, is inherently subjective and subject to debate.

Changes in the CPI since 1995

The BLS began to address the bias in the CPI even before the Boskin Commission was convened. For example, in 1995 the BLS introduced a new sampling procedure to determine which outlets to visit to obtain price data for specific items and what weights to apply to those item prices. The old procedure put too much weight on items that were temporarily cheap at that outlet, so when their prices rose back to their normal level, this registered as an increase in inflation. That same year, the BLS also revised sampling methods to remove the effects of substituting between brand drugs and generic drugs. In 1997, the BLS adopted some of the procedures used to measure hospital prices that are used in the producer price index.

Spurred by the work of the Boskin Commission, the BLS introduced further changes to confront substitution and outlet bias. The BLS has sought added funds to update the commodity and outlet samples more frequently and to do so at lower cost. Updating the commodities and the outlets more often should reduce substitution bias by allowing the published index to include more of households' responses to observed price changes. There also have been attempts to reduce quality bias. For example, the BLS is expanding the use of hedonic regressions to compare quality differences. Hedonic

regressions attempt to estimate econometrically the value that households put on quality differences. These methods are currently used for measuring quality distinctions in the categories of apparel, rent, and computers and peripheral equipment, and as of January 1999, they will be used for television prices. Research is underway to extend this technique to other categories.

Planned Changes

Future changes will address substitution and new product bias further. Beginning next January, the BLS will attempt to reduce lower-level substitution bias by using a geometric mean formula to calculate price changes for many of the basic categories of the CPI. The geometric mean formula assumes the household spends the same proportion of its outlays on each category; the arithmetic mean, which is now in use, assumes the household always buys the same quantity of each item. Using the geometric mean implies that if the price of pippin apples rises 10%, the quantity of pippins bought decreases 10%, so that the average household spends the same amount on pippins. This assumption is, of course, arbitrary, but it may give a better overall result than the assumption of no substitution. The BLS has estimated the monthly CPI using both methods over the past few years and concluded that adopting the geometric mean formula will reduce measured inflation by about 0.2 percentage point annually (the Boskin Commission estimated that lower-level substitution bias raised measured inflation by about 0.25 percentage point). The new formula will be used to calculate inflation in most categories in the CPI except those in which consumers cannot easily substitute between alternatives when there is a relative price change: for example, no change in relative prices would cause a person with a heart problem to consider buying a hearing aid. The new approach will be used only to aggregate price changes of individual commodities into broad commodity groups; these groups will continue to be aggregated into the overall index using fixed-quantity weights. After this change has been completed, the reduction in measured inflation due to methodological changes since 1995 is estimated to be 0.6 percentage point.

The BLS will update more frequently the expenditure weights obtained from the Consumer Expenditure Survey. The BLS is in the process of deciding how often the weights will be updated and wishes to increase the sample size of the survey to allow the use of only two years of expenditure data to construct the weights. These changes will make the market basket more representative of what consumers are actually purchasing and will introduce new products in a more timely manner.

To tackle upper-level bias more extensively, the BLS will produce an official "superlative index" starting in 2002 in addition to the CPI. This term—originally coined by Canadian economist, Erwin Diewert—refers to an index that approximately removes all substitution bias for most assumptions about household preferences. One superlative index is the Fisher ideal index, which uses a combination of weights from both the original market basket and the current market basket to take into account changes in consumer spending patterns. A version of this method is currently used in constructing the national income and product accounts. A superlative index would be subject to revision unless it was published with a time lag, because it takes time to gather data on current expenditures; thus, the CPI cannot be converted to a superlative index. However, recent research suggests that if the current market basket were initially represented by the basket for the previous year, the degree of subsequent revision required would be small.

Implications for Public Policy

Since the Fed uses the CPI as an indicator of price inflation, a more accurate index should make anti-inflationary monetary policy more effective. The public will have a better indicator to check how well

the Fed is doing its job. The effect on policy is not likely to be large, however, because the Fed already takes account of the best available estimate of the remaining biases in the published data. On the other hand, when inflation was higher, modest errors were less important since it was always appropriate to make policy with a view to reducing inflation. But now that we are closer to zero inflation, an accurate measure is more important, especially if policymakers wish to avoid a situation where actual inflation is negative. Under the Boskin Commission estimate of a total upward bias of 1.1 percentage points, a goal of zero inflation would be equivalent to an actual goal of -1.1%.

Some economists argue that negative inflation is undesirable in the long run. If it is difficult to reduce nominal wages, then it may not be possible to lower individual workers' real wages if prices are not rising. This may mean that it is difficult to provide appropriate incentives to move unneeded workers into other lines of work where they are more useful. Similarly, declining prices may cause the real value of debts to rise, which could cause some otherwise sound businesses to fail. Finally, if we want our tax and transfer system to be invariant to inflation, an accurate CPI is essential, so that the task of adjusting tax and transfer payments to price changes can be done quickly, easily, and without undue dispute.

Conclusion

Ongoing research is necessary to identify biases in the CPI. Changes to this index are inevitable as the BLS strives to maintain an accurate measure of inflation in our dynamic economy. By 1999, about half of the bias identified by the Boskin Commission will have been removed. Although the changes may be inconvenient—because they make the current index less comparable with the past index—they will lead to an improved measure of actual inflation and, thus, a better CPI.